

Notice of Allowability

Application No.

09/835,757

Examiner

Wesley D Markham

Applicant(s)

JAYATISSA, AHALAPITIYA H.

Art Unit

1762

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to examiner's amendment A.
2. ☒ The allowed claim(s) is/are 1-12.
3. ☒ The drawings filed on 16 April 2001 are accepted by the Examiner.
4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☐ All b) ☐ Some* c) ☐ None of the:
 1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).
 - * Certified copies not received: _____.
5. ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
 - (a) ☐ The translation of the foreign language provisional application has been received.
6. ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application. **THIS THREE-MONTH PERIOD IS NOT EXTENDABLE**

7. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
8. ☐ CORRECTED DRAWINGS must be submitted.
 - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No. _____.
 - (b) ☐ including changes required by the proposed drawing correction filed _____, which has been approved by the Examiner.
 - (c) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No. _____.

Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet.

9. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

- | | |
|--|--|
| 1 <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 2 <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3 <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 4 <input checked="" type="checkbox"/> Interview Summary (PTO-413), Paper No. <u>attached</u> |
| 5 <input type="checkbox"/> Information Disclosure Statements (PTO-1449), Paper No. _____ | 6 <input checked="" type="checkbox"/> Examiner's Amendment/Comment |
| 7 <input type="checkbox"/> Examiner's Comment Regarding Requirement for Deposit of Biological Material | 8 <input checked="" type="checkbox"/> Examiner's Statement of Reasons for Allowance |
| | 9 <input type="checkbox"/> Other |

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EXAMINER'S AMENDMENT / ALLOWANCE

Election/Restrictions

Restriction to one of the following inventions is required under 35 U.S.C. 121:

- I. Claims 1 – 12, drawn to a method of forming carbon nanotubes on a substrate, classified in class 427, subclass 249.1.
- II. Claim 13, drawn to an apparatus for forming carbon nanotubes on a substrate, classified in class 118, subclass 723HC.

The inventions are distinct, each from the other because of the following reasons:

Inventions I and II are related as process and apparatus for its practice, respectively. The inventions are distinct if it can be shown that either: (1) the process as claimed can be practiced by another materially different apparatus or by hand, or (2) the apparatus as claimed can be used to practice another and materially different process. (MPEP § 806.05(e)). In this case, the apparatus as claimed can be used to practice another and materially different process, such as a process of depositing a material other than carbon nanotubes, for example graphite, diamond, etc., on a substrate, or a process of etching a substrate.

Because these inventions are distinct for the reasons given above and have acquired a separate status in the art as shown by their different classification and recognized divergent subject matter, restriction for examination purposes as indicated is proper.

During a telephone conversation with Mr. Terryence Chapman on 8/14/2003, a provisional election was made without traverse to prosecute the invention of Group I,

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Claims 1 – 12. Affirmation of this election must be made by applicant in replying to this Office Action. Claim 13 is withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

Examiner's Amendment

An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with Mr. Terryence Chapman on 8/18/2003.

The application has been amended as follows:

In the specification:

On page 4, line 27, the sentence --The substrate can be heated to a temperature of from 650 – 900° C.-- has been inserted between the words "therethrough." and "Ammonia".

In the claims:

Claim 13 has been canceled.

Allowable Subject Matter

Claims 1 – 12 are allowed.

The following is an examiner's statement of reasons for allowance: Independent Claim 1 (from which Claims 2 – 12 depend) is drawn to a method of forming carbon nanotubes on a substrate. The method comprises the steps of providing a CVD chamber having a coiled filament disposed therein, supporting a substrate having a catalytic coating provided thereon inside the coiled filament, evacuating air, if present, from the chamber, heating the filament and applying a bias voltage between the filament and the substrate, introducing a reactant gas into the chamber, and pyrolyzing the reactant gas to deposit the carbon nanotubes on the substrate.

A summary of the closest prior art of record follows. Ren et al. (WO 99/65821 A1) and Ren et al. ("Synthesis of Large Arrays of Well-Aligned Carbon Nanotubes on Glass", *Science*, Vol.282, Nov. 1998, pages 1105 – 1107) both teach depositing arrays of aligned carbon nanotubes on catalytically-coated substrates by a plasma enhanced hot-filament CVD process in which a carbon source gas is thermally decomposed by the hot-filament and also turned into a plasma in order to deposit the nanotubes. However, neither of the Ren et al. references teaches or reasonably suggests supporting the substrate inside the coiled filament and applying a bias voltage between the filament and the substrate, as required by Claim 1. Chen et al. (USPN 6,495,258 B1) teaches a method of depositing carbon nanotubes on a non-woven network of interconnected fibers having a catalyst deposited thereon, the method comprising dissociating a carbon source gas by contacting the gas with a hot-filament and depositing carbon nanotubes

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on the network of fibers by using the dissociated gas. However, Chen et al. does not teach or reasonably suggest supporting the substrate inside the coiled filament and applying a bias voltage between the filament and the substrate, as required by Claim 1. As such, the prior art of record, alone or in combination, does not teach or reasonably suggest each and every limitation of independent Claim 1, and this claim is allowed. Since Claims 2 – 12 depend from Claim 1, these claims are also allowed.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Wesley D Markham whose telephone number is (703) 308-7557. The examiner can normally be reached on Monday - Friday, 8:00 AM to 4:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Shrive Beck can be reached on (703) 308-2333. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

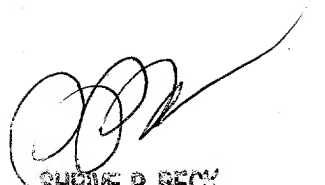
Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

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